

Assignment 1: Hierarchical 2D Transformations and GLUT interaction

Due: 1/31/2011 at 11:59pm

Objective: Create a 2D interactive experience that makes use of: Translate, Rotate, and Scale. To get started, download the template [assignment1.zip](#) (attached in bb).

1. Obtain/Create models (5 points)

Note that we will not be grading the quality of your models. You may obtain 3D models using any of the following 3 ways:

A. A text editor

B. A modeler: Professional ones like 3DSMax and Maya are complex. A free one I suggest is : misfit model 3d (www.misfitcode.com/misfitmodel3d). Other options include Blender (www.blender.org), Artofillusion (www.artofillusion.org), and Milkshape ([\\$25](http://www.swissquake.ch/chumbalum-soft/ms3d/index.html) registration fee after 30 days).

C. You can use models from the web (e.g. free models from [turbosquid](http://www.turbosquid.com)), however, you must give credit in your report. Otherwise, you will lose all points for the model component.

File Format: The file format we will be using is Alias Wavefront's OBJ file format (which is exported by most modeling packages). Writing your own reader is acceptable, though we will provide you with one.

Hierarchical Models: One of your models should be articulated (hierarchically connected and animated inside your application). This means that they share transforms in your transformation hierarchy. The models can be made up of separate files. E.g. a robot arm could be made up of hand.obj, lower_arm.obj, and upper_arm.obj connected by geometric transforms. DO NOT try to animate anything inside modeling software. It won't import as an obj.

2. Load and render all your models in an OpenGL window (10 points)

3. User control of the hierarchical model using the keyboard or menu (70 points)

When the user right-clicks on the window, a list of all the commands should be listed, as well as the associated keyboard shortcuts.

For the entire model,

A. The user should be able to *translate* the hierarchical model using the keyboard OR menu (i.e., either one, user decides).

B. The user should be able to *rotate* (in 5 degree increments) the hierarchical model using the keyboard OR menu

C. The user should be able to *scale* (by a factor of 0.5 or 2) the hierarchical model using the keyboard OR menu.

For each part of the model (the whole model should be made of at least 3 articulated parts),

A. The user should be able to *rotate* (in 5 degree increments) one part of the hierarchical model using the keyboard OR menu.

B. The user should be able to *scale* (by a factor of 0.5 or 2) one part of the hierarchical model using the keyboard OR menu.

Grads: Have a projectile (e.g., a sphere or a GL_POINTS) that shoots from the lowest level of the hierarchy when the user presses 'x' (i.e. as if the robot arm was shooting a gun). Once fired, the projectile's transformation should not be affected by the transformation of the hierarchical model.

4. Create a report (webpage/pdf/worddoc) (15 points)

A. Explain how the controls of your assignment

B. Explain the visual result of drawing two overlapping objects (1 paragraph) – 5 points

C. Explain how you might prevent two 2D objects from overlapping (1 paragraph) – 5 points

C. Make a graph of number of objects drawn (~10, ~100, ~1000, ~10000, ~100000 objects per frame vs. the frames per second) – 5 points

5. Submit on blackboard

Create a zip file of files required to compile and run your project and your report. Also include a precompiled .exe in your .zip file.

Grading:

100 pts

For each of the above sections,

a great job = full points

a good job = 75% of the points

a flawed job = 50% of the points

nothing = 0%

The evaluation of the job will be technical correctness and complexity of the effort.

With permission, this assignment was based upon:

<http://www.cise.ufl.edu/~lok/teaching/csgss08/assignment1.html>